

1        Labelless, Rolled Food Item And Its Fabrication  
      BACKGROUND

      The present invention generally relates to food items, particularly to rolled food items, more  
5 particularly to coils of food supported on support material, and specifically to rolled food items or the like at least temporarily retained in a coiled condition without the use of a label during its fabrication.

      The sale of snack-type food products is a highly  
10 competitive business. In addition to the particular food components, increasingly the novelty and play value of the product are important in the marketability of any particular food item. For example, fruit-based snack products such as FRUIT ROLL-UPS™ fruit products have  
15 found wide market acceptance. Likewise, U.S. Patent No. 4,882,175 recognized the enhanced marketability of chewing gum in the form of a rolled-up tape allowing the consumer the chance to break off the desired size of piece to chew, saving the rest for later.

20        Many foods such as dehydrated fruit puree do not lend themselves to forming rolled food items such as where the food is in a strip of a thinness generally requiring external support and/or where the food tends to stick to itself such that it creates a single mass which can not  
25 be unrolled. In such cases, support material and food supported thereon are rolled into a coil creating a novelty form of merchandising for that food. For example, FRUIT BY THE FOOT™ fruit products of the type disclosed in U.S. Patent Nos. 5,455,053 and 5,723,163 have  
30 enhanced play value which is believed to promote the marketability thereof.

      During the fabrication of rolled food items, provisions have to be made to prevent the food item from unrolling during fabrication such as in the wrapping and  
35 other packaging operations. A prior preferred method to prevent undesired unrolling is the application of a label extending over the trailing edge of the support material.

1 In addition to its functional aspects, the labels used to  
hold the rolled food items in a coiled condition can add  
to the novelty and play value of the rolled food item.  
Particularly, the label often includes graphics which are  
5 visually appealing to the typical consumer of the food of  
the rolled food item and/or which promote the future  
purchase of the rolled food item. However, problems arose  
from the labels which had not been appropriately discarded  
after their removal from the rolled food item being  
10 difficult to remove when adhered to surfaces such as desk  
tops. One solution to this problem was to provide novel  
labels for such rolled food items such as of the type  
disclosed in U.S. Patent Appln. No. 08/888,803 filed July  
7, 1997, which is hereby incorporated herein by reference.

15 Another prior method to prevent unintentional  
unrolling is to utilize an edible adhesive such as corn  
syrup. However, corn syrup and similar adhesives have  
certain negatives including being an additive to the food  
which could affect its taste, texture, and/or appearance,  
20 being messy while eating and also during application and  
fabrication and being generally difficult to work with.

Accordingly, it is an object of the present invention  
to provide novel apparatus and methods for fabrication of  
a novel rolled food item which, in the preferred form, is  
25 retained at least temporarily in a coiled condition during  
fabrication such as in the wrapping and other packaging  
operations without the use of a label and which overcomes  
the negatives associated with the use of corn syrup and  
similar food adhesives.

30 Another object of the present invention is to allow  
the retention of the rolled food item in a coiled  
condition without the use of a label and without  
significant change to existing fabrication equipment and  
its operating conditions.

35 SUMMARY

Surprisingly, the above objectives and other problems  
can be satisfied in the field of rolled food items and

1 their fabrication by providing, in the preferred form, a  
first portion of the food adjacent the trailing edge  
having a moisture content greater than the remaining  
portions of the food and sufficient to increase the  
5 tackiness of the food to be adherable to the support  
material to retain the support material and food in a roll  
and to at least temporarily prevent unintentional  
unrolling of the roll during fabrication of the rolled  
food item.

10 In the preferred form, the first portion of the food  
is formed by spraying a source of moisture, and in the  
most preferred form a food grade water free of adhesive  
type additives, onto the food adjacent to the trailing  
edge prior to its rolling into the roll.

15 The present invention will become clearer in light of  
the following detailed description of an illustrative  
embodiment of this invention described in connection with  
the drawings.

#### DESCRIPTION OF THE DRAWINGS

20 The illustrative embodiment may best be described by  
reference to the accompanying drawings where:

Figure 1 shows a top plan view of a strip of support  
material and food according to the preferred teachings of  
the present invention, with portions broken away.

25 Figure 2 shows a side elevational view of the strip of  
support material and food of Figure 1 rolled into a roll  
to form a rolled food item.

Figures 3a and 3b show diagrammatic side elevational  
views of the apparatus for rolling the strip of support  
30 material and food of Figure 1 to form the rolled food item  
of Figure 2.

All figures are drawn for ease of explanation of the  
basic teachings of the present invention only; the  
extensions of the figures with respect to number,  
35 position, relationship, and dimensions of the parts to

1 form the preferred embodiment will be explained or will  
be within the skill of the art after the following  
description has been read and understood. Further, the  
exact dimensions and dimensional proportions to conform  
5 to specific force, weight, strength, and similar  
requirements will likewise be within the skill of the  
art after the following description has been read and  
understood.

Where used in the various figures of the drawings,  
10 the same numerals designate the same or similar parts.  
Furthermore, when the terms "first", "second", "edge",  
"end", "transverse", "longitudinal", "width", "length",  
"height", "inner", "outer", "leading", "trailing", and  
similar terms are used herein, it should be understood  
15 that these terms have reference only to the structure  
shown in the drawings as it would appear to a person  
viewing the drawings and are utilized only to facilitate  
describing the illustrative embodiment.

#### DESCRIPTION

20 A rolled food item according to the preferred  
teachings of the present invention is shown in the  
drawings and generally designated 110. In the most  
preferred embodiment of the present invention, rolled  
food item 110 is an improvement of the type shown and  
25 described in U.S. Patent Nos. 5,205,106; 5,284,667;  
5,455,053 and 5,723,163. For purpose of explanation of  
the basic teachings of the present invention, the same  
numerals designate the same or similar parts in the  
present figures and the figures of U.S. Patent Nos.  
30 5,205,106; 5,284,667; 5,455,053 and 5,723,163. The  
description of the common numerals and rolled food item  
110 may be found herein and in U.S. Patent Nos. 5,205,106;  
5,284,667; 5,455,053 and 5,723,163, which are hereby  
incorporated herein by reference.

35 Generally, rolled food item 110 includes strips of

1 food 14 and support material 16 simultaneously rolled  
about its leading edge or end 136 into a coil. Food 14 is  
of a thinness requiring external support by support  
material 16. In the most preferred form, food 14 is a  
5 sweetened dehydrated fruit-based material typically  
referred to in the art as a fruit leather which can be  
derived from fruit purees and in the most preferred form  
is of the same type as utilized in the first, solid or  
"hard" portion or region of the dual textured food piece  
10 described in U.S. Patent No. 4,847,098 issued July 11,  
1989 to J.E. Langler and in U.S. Patent No. 4,853,236  
issued August 1, 1989 to J.E. Langler, each entitled Dual  
Textured Food Piece of Enhanced Stability and each of  
which is hereby incorporated herein by reference.

15 Support material 16 may be formed of any suitable  
material such as silicon parchment paper which has the  
necessary strength to support food 14 without tearing and  
without bulkiness to allow rolling of food 14 and support  
material 16 into a compact food piece and which allows  
20 food 14 to be easily separated therefrom for consumption.

In the preferred form, the strip of food 14 has side  
edges spaced inwardly from the side edges of the strip of  
support material 16 and in the most preferred form are  
spaced in the order of one sixteenth inch (1.6 mm)  
25 inwardly from the side edges of the strip of support  
material 16. Depending upon the method of fabrication,  
spacing the strip of food 14 inward of the side edges of  
the strip of support material 16 is advantageous as food  
14 has less tendency to rub against the fabrication  
30 equipment which is undesirable as the side edges of the  
strip of food 14 could acquire an unsightly or otherwise  
undesirable appearance and as food 14 could build up or  
otherwise collect on the fabrication equipment requiring  
extra cleaning and maintenance. In the preferred form,  
35 the strip of food 14 does not extend beyond the leading  
end 136 and trailing edges or ends 138 of the strip of

1 support material 16 and in the most preferred form has a  
length equal to the length of the strip of support  
material 16 so that leading and trailing ends 136 and 138  
of the strip of food 14 are coextensive with leading and  
5 trailing ends 136 and 138 of the strip of support material  
16. Specifically, in the most preferred form, the strips  
of food 14 and support material 16 are formed continuously  
and are simultaneously cut to length such as by a water  
knife. In the preferred form, the width of the strip of  
10 support material 16 is minimal relative to its length and  
in the most preferred form, the strip of support material  
16 has a width in the order of one and one-eighth inch  
(2.9 cm) and a length in the order of 36 inches (1 meter).

The strips of food 14 and support material 16 are  
15 rolled around their leading edges or ends 136 into the  
coil having multiple rotations with the strip of support  
material 16 located on the outside of the roll or coil and  
with trailing edge 138 of the strips of food 14 and  
support material 16 located on the outside or periphery of  
20 the roll or coil. In the most preferred form, when the  
strips of food 14 and support material 16 are rolled, the  
periphery of the coil or roll is in the order of four and  
five-eighths inches (11.7 cm).

In the production of rolled food item 110, generally  
25 one or more strips of food 14 and support material 16 are  
transported in a generally planar condition such as on a  
conveyor 140 towards a roll-up section 76. It can be  
appreciated that strips of food 14 and support material 16  
can be formed in a variety of manners according to the  
30 teachings of the present invention including but not  
limited to the type disclosed in U.S. Patent Nos.  
5,205,106; 5,284,667; 5,455,053 and 5,723,163. Similarly,  
roll-up section 76 can be of a variety of forms according  
to the teachings of the present invention including but  
35 not limited to the type utilizing a reciprocable,  
rotatable tuning fork disclosed in U.S. Patent Nos.

1 5,205,106; 5,284,667; 5,455,053 and 5,723,163.

According to the teachings of the present invention, rather than providing a labeler and a label smasher as in U.S. Patent Nos. 5,205,106; 5,284,667; 5,455,053 and  
5 5,723,163, one or more spray nozzles 142 are provided vertically above and spaced from conveyor 140 and spaced in a manner to not physically contact the strips of food 14 and support material 16 on conveyor 140 and upstream of roll-up section 76. According to the teachings of the  
10 present invention, nozzles 142 spray a source of moisture in the preferred form of a liquid consisting of food grade water. In the preferred form, the water is free of adhesive type additives such as corn syrup and in the most preferred form is free of all additives.

15 In a preferred form, a fewer number of nozzles 142 are provided than the number of strips of food 14 and support material 16, with each nozzle 142 spraying a source of moisture over more than one strip of food 14 and support material 16. In this regard, four nozzles 142 could be  
20 provided to spray ten strips of food 14 and support material 16. In other forms, a separate nozzle 142 can be associated and transversely aligned with each strip of food 14 and support material 16. In such preferred forms, each nozzle 142 can have a spray pattern having a  
25 transverse width less than the width of the strip of support material 16, preferably less than the width of the strip of food 14, and most preferably approximately two thirds the width of the strip of food 14.

According to the teachings of the present invention,  
30 operation of each nozzle 142 is not continuous, but rather nozzles 142 spray a deposit 144 adjacent to trailing end 138 of the strips of food 14 and support material 16 and in the most preferred form with deposit 144 having a trailing end coextensive with the trailing end 138 of the  
35 strips of food 14 and support material 16, with deposit 144 extending upstream from trailing end 138. Deposit 144 which defines a first portion has a relatively short

1 length considerably shorter than the remaining, second  
portion of the strips of food 14 and support material 16  
and than the total elongated length of the strips of food  
14 and support material 16, with deposit 144 in the most  
5 preferred form being generally 10% of the elongated length  
of the strips of food 14 and support material 16. In the  
preferred form shown, deposit 144 has side edges spaced  
inwardly from and parallel to the side edges of food 14.  
According to the teachings of the present invention, the  
10 remaining second portions of the strips of food 14 and  
support material 16 (other than deposit 144) are free of  
spray liquid. In this regard and in the most preferred  
form, air is blown through nozzles 142 after supply of the  
spray liquid has been terminated to nozzles 142 to remove  
15 any droplets of spray liquid that have remained in the tip  
of nozzles 142 to insure that such droplets fall in deposit  
144 and not after leading edge 136 of the next strip of food  
14 and support material 16.

Food 14 as processed during fabrication has a moisture  
20 content which enhances its shelf life, and particularly has  
a moisture content which does not result in food 14  
undesirably degrading during normal storage times before  
consumption. With this moisture content, food 14 has a  
tackiness which may adhere to support material 16 when  
25 rolled into a roll but typically which is insufficient to  
prevent unintentional unrolling during further fabrication  
processes such as wrapping and other packaging operations.  
However, food 14 within deposit 144 has an increased  
moisture content so that food 14 becomes sticky or in  
30 other words has an increased tackiness sufficient to  
adhere to support material 16 in the roll to prevent  
unintentional unrolling of the roll at least temporarily  
during further fabrication processes. In the most  
preferred form, food 14 is fabricated in a continual  
35 process and has a constant consistency (aside from  
moisture content) between the leading and trailing ends  
136 and 138. In this regard, food 14 itself adheres to



1 support material 16 and specifically food 14 does not  
include an additive or adhesive which secures food 14 to  
support material 16.

The strips of food 14 and support material 16  
5 including deposit 144 can be rolled in roll-up section 76  
in the conventional manner so that support material 16 is  
located on the outside of the roll, trailing edge 138 is  
located on the periphery of the roll, and leading edge 136  
is located adjacent the center of the roll and in the most  
10 preferred form, with the strip of support material 16 and  
food 14 being rolled around leading end 136 which is cut  
and into a roll having multiple rotations. According to  
the teachings of the present invention, deposit 144 will  
cause food 14 adjacent to trailing end 138 to adhere to  
15 support material 16 on the underlying wind of rolled food  
item 110 and specifically without requiring the use of a  
label. It should be appreciated that roll-up section 76  
can include a pressure plate such as of the type disclosed  
in U.S. Patent Nos. 5,205,106; 5,284,667; 5,455,053 and  
20 5,723,163 to place pressure upon and to adhere food 14 of  
increased tackiness within deposit 144 to support material  
16 to thus secure the strip of food 14 and support  
material 16 in a rolled or coiled condition during later  
fabrication steps such as in wrapping and other packaging  
25 operations.

The spray liquid should be applied by nozzles 142 in  
deposits 144 in an amount so that food 14 develops  
sufficient tackiness to be adherable to the strip of support  
material 16. Specifically, the adhesion of food 14 on  
30 support material 16 depends on the viscoelastic and the  
surface tension properties of food 14. Support material 16  
is silicone coated in the most preferred form to achieve  
just enough cohesive bond between food 14 and support  
material 16, such that the former remains attached to the  
35 later during processing and storage. However, food 14 peels  
easily off support material 16 for consumption. Studies  
with adhesive strength of synthetic films showed that the

1 higher the wettability of the film, the greater the adhesive  
strength between the product and the film. The normal water  
activity of food 14 does not allow support material 16  
(whose wettability has been reduced by silicone coating in  
5 the preferred form) to adhere to trailing edge 138 of food  
14 during the formation of rolled food item 110. According  
to the teachings of the present invention, the water  
activity of food 14 within deposit 144 at trailing edge 138  
was increased by the application of the spray liquid just  
10 before rolling in roll-up section 76. Because of the  
viscoelastic nature of food 14, the pressure applied in  
roll-up section 76 to trailing edge 138 of rolled food item  
110 helps in the adhesion of deposit 144 of food 14 to the  
body of the roll. It was observed that too much moisture in  
15 food 14 also decreases the adhesion characteristics of food  
14.

In this regard, a method was devised to measure the  
adhesion strength of the formed rolled food item 110. A  
texture analyzer, Model XT2, made by Stable Micro Systems,  
20 England was used for this purpose. The sample holder  
consisted of an aluminum rod hinged between two clamps,  
which in turn were attached to a wooden base. The whole  
assembly was attached to the texture analyzer in such a way  
that the rod is positioned horizontally, crossways to the  
25 operator, directly beneath the probe of the texture  
analyzer. A sample rolled food item 110 was collected as  
soon as rolled food item 110 was formed in roll-up section  
76. A 1.2 cm by 1.2 cm VELCRO sticky back square was gently  
taped to rolled food item 110 in such a way that trailing  
30 edge 138 of support material 16 aligns with an edge of the  
square. Rolled food item 110 was slipped into the aluminum  
rod and was placed in contact with the probe of texture  
analyzer already equipped with a complementary VELCRO sticky  
back square. The rod was then secured between the clamps,  
35 and the tensile strength required to peel trailing edge 138

1 of rolled food item 110 was recorded. The separation speed  
of the probe was set at 2 mm/sec.

For proper adhesion of trailing edge 138 of the strip of  
support material 16 and food 14 to the roll body, a minimum  
5 adhesive strength of 42 grams-force/cm<sup>2</sup>, measured through the  
peel off test as described above, was required. An adhesive  
strength of 100 to 300 grams-force/cm<sup>2</sup> was found to be  
optimum. A water activity above 0.59 in deposit 144 gives  
proper adhesion of rolled food item 110. However, a water  
10 activity above 0.64 results in less tacky products. The  
optimal range therefore, is 0.59-0.64 water activity for  
food 14 after the application of the spray liquid.

It should be appreciated that after fabrication has  
been completed, the spray liquid within deposit 144 over  
15 time may decrease such as the result of evaporation or  
dispersion throughout the remaining portions of food 14 to  
be of an amount to reduce its tackiness, even to an amount  
which is insufficient to adhere food 14 to the strip of  
support material 16. However, the forces which would tend  
20 to unintentionally unroll rolled food item 110 is  
considerably less after fabrication. In fact after  
fabrication, reduction of tackiness may desirably increase  
the ease at which rolled food item 110 can be initially,  
intentionally unrolled by the consumer. Additionally, the  
25 evaporation and/or dispersion of the spray liquid from  
deposit 144 is also advantageous in the reduction of the  
possibility of the degradation of food 14 in deposit 144  
as the result of the increased moisture content including  
but not limited to molding. In this regard, it should be  
30 appreciated that if nozzles 142 were operated continuously  
or in a manner to spray substantial portions of the strip  
of food 14 and support material 16 in an amount to develop  
adhering tackiness, the shelf life of the resulting rolled  
food item could be significantly reduced to an extent  
35 which would make it unmarketable.

1        Rolled food item 110 according to the teachings of the  
present invention is advantageous over prior rolled food  
items. In particular, the strip of food 14 and support  
material 16 is contacted only by a spray and in particular  
5 is not mechanically contacted such as required during the  
application of labels. Further, in the most preferred  
form, only water is added and particularly no other food  
ingredient such as corn syrup is added which could affect  
the consistency, taste or appearance of food 14.  
10 Additionally, problems in the handling of corn syrup or  
like food additives including clogging additive passages  
and stickiness when contacting other surfaces and  
apparatus components including the cleaning thereof is  
avoided when water is utilized. In fact, existing  
15 fabrication equipment can be easily modified by the simple  
replacement of the labeler and associate label applying  
accessories or other fabrication unrolling prevention  
provisions with nozzles 142. In the preferred form with  
only water being sprayed, clogging and cleaning  
20 requirements of nozzles 142 are minimized in comparison to  
the problems associated with moving and cleaning corn  
syrup or similar food adhesives. Additionally, the  
fabrication and inventory costs for labels as well as the  
capital costs associated with the fabrication and  
25 application of such labels are avoided. Thus, existing  
fabrication equipment and its operating conditions can be  
utilized without significant change and in many cases with  
more trouble free operation.

Now that the basic teachings of the present invention  
30 have been explained, many extensions and variations will  
be obvious to one having ordinary skill in the art. For  
example, although the operation of spray nozzles 142 is  
shown while the strip of food 14 and support material 16  
is being rolled adjacent to its leading end 136, deposit  
35 144 can be provided at any position upstream of roll-up  
section 76 including while the strip of food 14 and  
support material 16 is generally in a planar condition

1 according to the teachings of the present invention.

Similarly, although the operation of spray nozzles 142  
is shown while the strip of food 14 and support material  
16 is of its marketable length, deposit 144 can be sprayed  
5 on food 14 and support material 16 prior to cutting into  
multiple strips and/or cutting to length according to the  
teachings of the present invention when food 14 is  
continuously applied to continuous roll stock of support  
material 16.

10 Thus since the invention disclosed herein may be  
embodied in other specific forms without departing from  
the spirit or general characteristics thereof, some of  
which forms have been indicated, the embodiments  
described herein are to be considered in all respects  
15 illustrative and not restrictive. The scope of the  
invention is to be indicated by the appended claims,  
rather than by the foregoing description, and all changes  
which come within the meaning and range of equivalency of  
the claims are intended to be embraced therein.